DRAFT ENVIRONMENTAL ASSESSMENT

2003 GYPSY MOTH SUPPRESSION PROJECT

PRINCE WILLIAM FOREST PARK
NATIONAL PARK SERVICE
US DEPARTMENT OF THE INTERIOR

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I. EXECUTIVE SUMMARY

This Environmental Assessment has been prepared to evaluate the various alternatives considered for the management of a gypsy moth (*Lymantria dispar*) infestation at Prince William Forest Park. Two alternatives were considered but removed from detailed study, and three alternatives were considered in detail. Alternative 2, the preferred alternative, involves one application of *Bacillus thuringiensis kurstaki* (B.t.k.) to the proposed treatment area (143 acres), under a contract secured by the Virginia Department of Agriculture and Consumer Services (VDACS). It meets the stated project objective and is readily available for use.

Prince William Forest Park staff have been monitoring gypsy moth populations since the 1970s, and performed gypsy moth suppression from 1989 through 1995 and in 2002. The gypsy moth population in the park declined to negligible levels in 1995 as a result of an epidemic caused by the fungal pathogen *Entomophaga maimaiga*. In the summer of 2001, an isolated infestation was discovered in Oak Ridge Campground and along a portion of the park's Scenic Drive. Egg mass densities were extremely high in these areas averaging 5794 egg masses/acre. Following the recommendations outlined in the 2002 Forest Health Evaluation of the Gypsy Moth Infestations (Sellers, 2002), and after careful review of current policy and literature, Prince William Forest Park treated 309.8 acres with one application of *Bacillus thuringiensis* variety *kurstaki* (B.t.k.). Egg mass surveys conducted in September 2002 showed that the treatment effort was largely successful, but re-treatment in 2003 would be necessary to reduce the population below threshold levels. The acreage requiring treatment in 2003 is 143 acres, and the average egg mass density for the area has decreased by 75.7% to 1407 egg masses/acre.

II. PURPOSE AND NEED FOR ACTION

A. INTRODUCTION

The gypsy moth (*Lymantria dispar*) was introduced into the United States in Massachusetts in 1869, when it accidentally escaped from the home of an entomologist studying it for silk production. It is now found throughout the northeastern US, from Wisconsin to northern North Carolina, and is continuing to spread westward. The gypsy moth is native to Europe, Asia and northern Africa. In these areas, natural controls such as competition for resources, predators, parasites, and disease generally keep populations from exploding. In North America, the gypsy moth has relatively few competitors and even fewer predators or parasites. For this reason, it has been able to thrive, feeding on many of our native hardwoods. The gypsy moth is often transported long distances by wind and vehicles into non-infested areas. A combination of high visitation from across the US and abundant habitat puts Prince William Forest Park (PRWI) at a high risk for gypsy moth infestation and subsequent defoliation.

The gypsy moth has a four stage life cycle: egg, larva (caterpillar), pupa (cocoon), and adult (moth). Egg masses containing 100-1000 eggs are deposited on tree trunks, limbs, buildings, camping trailers, and many other surfaces in July and August. The larvae emerge from the eggs in mid-April, and go through 5 to 6 larvae instars or growth stages. Newly emerged larvae are dispersed by wind currents (balloon) to new locations and begin feeding. Feeding occurs throughout May and June, with defoliation most apparent by mid-June. The pupal stage begins in late June and lasts for approximately 2 weeks. Adult moths emerge in late July to early August and begin breeding, they do not feed. The gypsy moth caterpillars have been shown to feed on over 500 species of plants, although their preferred hosts are oaks. Since oak species comprise approximately 70% of the park's canopy, it has a high potential for extensive defoliation.

The 1995 Final Environmental Impact Statement (FEIS) prepared by the United States Forest Service (USFS), and the subsequent Record of Decision signed January 1996, discuss the impacts of gypsy moths on the environment and on humans. Repeated defoliation can result in tree mortality by weakening trees, making them more susceptible to disease and parasites. The loss of mature trees impacts the forest community and surrounding environs. Dead trees detract from the viewshed and can be hazardous for park staff and visitors alike. Finally, a high concentration of caterpillars and their frass impairs the desired visitor use experience at the park.

This Environmental Assessment (EA) will examine the alternatives and impacts of gypsy moth suppression in Prince William Forest Park in the spring of 2003. Treatment efforts will be directed towards protecting the park's natural, cultural, and recreational resources. Any decisions regarding gypsy moth management will be made in accordance with all federal statutes and policies.

B. BACKGROUND

Prior to the 1700's, the area that is now Prince William Forest Park was forested by deciduous trees. By the early part of the 20th century, much of that land had been farmed or mined. In 1933, the Chopawamsic Recreation Demonstration Area was created, one of 46 recreation demonstration projects in 25 states. The Civilian Conservation Corps (CCC) constructed five cabin camps, numerous roads and lakes, and miles of trails to provide recreational opportunities. Management of the recreation area was turned over to The National Park Service (NPS) in 1936 through Executive Order 7496, and, in 1948, its name was changed to Prince William Forest Park (Public Law 736). Today, the focus is on preserving and interpreting the park's significant natural and cultural resources and providing recreational opportunities for the public in accordance with the Organic Act of 1916.

At 17,600 acres, Prince William Forest Park preserves the largest example of Piedmont forest in the National Park System. It is located in Prince William County, Virginia, one of the fastest growing counties in the state. As development around the park increases, the value of the park and its resources is also increasing. Eighty percent of the Quantico Creek watershed is within the park boundary and the park provides a large expanse of habitat for native plants and animals. Prince William Forest Park receives about 225,000 visitors annually who participate primarily in passive forms of recreation such as driving the nine mile Scenic Loop, hiking, biking, and camping. Oak Ridge Campground is a popular visitor use area consisting of 100 family campsites, 3 restroom facilities, and an amphitheater. Two trails, South Valley and Farms to Forest, begin at the small parking lot at the entrance to the campground. Annual visitation at the campground is about 7,800, with peaks in April - May and September - October.

C. HISTORY OF GYPSY MOTH IN PRWI

The National Park Service and United States Forest Service (USFS) began a gypsy moth trapping program in Prince William Forest Park in the late 1960s. In the summer of 1970, a gypsy moth and egg mass were found near the park's Travel Trailer Village. Parasitic wasps were released, and the following year no gypsy moths or egg masses were found. In 1980, the trapping program was expanded to monitor the growth of the gypsy moth population, and over the winter of 1980-81, egg mass surveys were conducted. Larval banding surveys were begun in 1982, and the data from the monitoring program showed low levels of gypsy moth populations until 1986. The number of male moths trapped increased dramatically in 1986, but egg mass surveys did not show an increase until the 1988 fall survey. Moderate to severe defoliation occurred in limited areas in 1990 through 1994, with significant oak mortality occurring in 1992 and 1993, necessitating the removal of approximately 1500 trees from developed areas and the Chopawamsic Backcountry area. In 1991, 2000 parasitic wasps, *Cotesia melanoscela*, were released in the park at Pine Grove (1000) and at parking lot B (1000). Aerial pesticide treatments of *Bacillus thuringiensis* variety *kurstaki* (B.t.k.) or Gypchek®, nucleopolyhedrosis virus (NPV), were conducted from 1989 through 1995 and in 2002 (Table 1).

Table 1 Past Gypsy Moth Treatment at PRWI

YEAR	ACRES	TREATMENT AREAS
1989	150	Oak Ridge Campground, Route 234 near Nottingham Road and

		Travel Trailer Village
1990	754	Oak Ridge Campground, Scenic Drive, Route 234
1991	980	Cabin Camps 1&4, Oak Ridge Campground, Scenic Drive, Telegraph Picnic Area, Route 619
1992	579	Turkey Run Ridge, Oak Ridge Campground, Cabin Camps 1 & 4, Scenic Drive, Headquarters, Telegraph Picnic Area
1993	664	Oak Ridge Campground, Travel Trailer Village, Natural Resource protection zone, Telegraph Picnic Area, Cabin Camps 1 & 4, Turkey Run Ridge, Headquarters, Maintenance, Scenic Drive between parking lots H and E
1994	1261	Oak Ridge Campground, Travel Trailer Village, Cabin Camps 1, 2, 4, & 5, End. Sp. Zone, Turkey Run Ridge, Scenic Drive, Goodwill Camp, Maintenance, Telegraph Picnic Area
1995	589	Cabin Camp 1, Telegraph Picnic Area, Travel Trailer Village, Oak Ridge Campground, Scenic Drive between parking lots G and E
2002	309.8	Oak Ridge Campground, Scenic Loop between parking Lot F and Oak Ridge

Entomophaga maimaiga, a pathogenic fungus that was released in throughout the Northeast in the 1980s for experimental control of the gypsy moth, successfully eliminated the gypsy moth from most of the middle Atlantic states beginning in June of 1995. From 1996 through 2001, park staff, in coordination with the regional IPM coordinator, the USFS, and the Virginia Department of Forestry, continued to monitor gypsy moth populations in the park. During the summer of 2001, an outbreak of gypsy moth occurred at Oak Ridge Campground and along the Scenic Loop between parking lot F and the campground (309.8 acres). Egg mass surveys performed in the area resulted in an average density of 5794 egg masses/acre, well above the NPS treatment threshold of 500 egg masses/acre. This area was treated in the spring of 2002, and aerial surveys conducted in early June 2002 revealed approximately 50 acres of partial defoliation. Follow up egg mass surveys were conducted in September 2002 resulted in an average density of 1407 egg masses/acre covering 142.70 acres.

D. SCOPE OF PROJECT

Prince William Forest Park is involved in an Integrated Pest Management (IPM) program for control of the gypsy moth in coordination with the USFS. This program emphasizes population monitoring, maximizing natural controls, and selectively integrating environmentally acceptable insecticides where needed. The USFS is coordinating the aerial suppression efforts for the National Park Service's National Capital Region parks, and treatment costs were obtained from the 2003 Forest Pest Management funds. Prince William Forest Park will be treated under a contract secured by the Virginia Department of Agriculture and Consumer Services.

The proposed project is needed to reduce the impact of gypsy moth caused forest defoliation in developed park zones. The developed areas of the park include the campgrounds, picnic areas, and other areas of concentrated recreational use, for this project they include Oak Ridge Campground and a portion of the park's Scenic Drive adjacent to the road leading to the

campground. Defoliation of the forest canopy in these visitor use areas would result in increased mortality in trees already subject to recreation related stress, and would impact the visitor use experience. Dead and dying trees create a potential problem for public safety.

E. PROJECT OBJECTIVES

The project objectives are to:

1. Suppress current gypsy moth infestations with Integrated Pest Management actions.
2. Prevent the movement of gypsy moth populations from infested to non-infested areas in the park.
3. Prevent extensive forest defoliation by the gypsy moth in the park.
4. Reduce risks to public safety brought on by increased numbers of hazard trees in visitor use areas.
5. Mitigate reduction of recreational values threatened by forest canopy defoliation, and abundance of gypsy moth larvae and their frass.
6. Cooperate with federal, state, and local agencies on the suppression of gypsy moth on the lands in and around the park.

The proposed project will be considered successful if (1) 70% foliage protection is achieved, as determined by aerial survey, and (2) egg mass densities are reduced to below the threshold of 500 egg masses per acre on land treated for the year.

F. POLICY

The National Environmental Policy Act (1969, as amended) requires all federal agencies to carefully consider the range of alternatives and impacts for a proposed project that may affect the human environment.

The Endangered Species Act (1978, as amended) requires all federal agencies to consult with the United States Fish and Wildlife Service to determine the potential impacts to federally listed rare, threatened or endangered species that may result during a proposed project.

The Federal Insecticide, Fungicide and Rodenticide Act (1947) requires that all pesticides must be registered with the U.S. Environmental Protection Agency, and applications must follow the label instructions.

Chapter 4, Section 4.4.1.3 of the NPS Management Policies (2001) defines an exotic species as:

> "…those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as non- native, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place."

Chapter 4, Section 4.4.4.2 of the NPS Management Policies (2001), provides provisions for controlling and/or removing exotic species from park areas.

"All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed - up to and including eradication - if (1) control is prudent and feasible and (2) the exotic species:

- Interferes with natural processes and the perpetuation of natural features, native species or natural habitats; or
- Disrupts the genetic integrity of native species; or
- Disrupts the accurate presentation of a cultural landscape; or
- Damages cultural resources; or
- Significantly hampers the management of park or adjacent lands; or
- Poses a public health hazard as advised by the US Public Health Service (which includes the Centers for Disease Control and the NPS Public Health Program); or
- Creates a hazard to public safety.

High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controllable. Lower priority will be given to exotic species that have almost not impact on park resources or that probably cannot be successfully controlled."

Chapter 4, Section 4.4.5.1 of the NPS Management Policies (2001), defines pests as:

"…living organisms that interfere with the purposes or management objectives of a specific site within a park, or that jeopardize human health or safety…. Exotic pests will be managed according to the exotic species policies in section 4.4.4.2"

NPS 77, Natural Resouces Management Guidelines, Chapter 2, part II D. (p289) addresses the management of exotic species in parks.

"Control or eradication will be undertaken, where feasible, if exotic species threaten to alter natural ecosystems; seriously restrict, prey on, or compete with native populations; present a hazard to human health or safety; cause a major scenic or aesthetic intrusion; … or threaten resources or cause a health hazard outside the park."

Further, part II F 2d (Guidance For Exotic Invertebrates, p 296) provides specifically for invertebrate pests such as the gypsy moth.

"Exotic invertebrates pose special problems in that invertebrate eruptions can occur rapidly and involve extensive areas. Relatively well-developed integrated pest management strategies exist for some exotic insects, especially pests of forest trees…. However, it may not be possible to apply all commonly used techniques in natural ecosystems. For example, broad spectrum pesticides may kill important native insects as well as exotic species."

The Prince William Forest Park Resource Management Plan (RMP) (February 1995), Project Statement PRWI-N-700.100 Integrated Pest Management: Gypsy Moth Management, outlines the goals of park specific treatment programs.

"The major objective of any suppression activity will be to mitigate the severity of initial gypsy moth outbreak, hasten progression to a stable population, kept in check by natural forces, and protect the visitor from hazard."

The decision to prepare this Environmental Assessment is based upon findings in the USFS's Final Environmental Impact Statement (1995) and subsequent Record of Decision (1996) regarding gypsy moth management in the United States.

G. BIOLOGICAL EVALUATIONS

Egg mass monitoring data collected in the fall of 2002 are found in Appendix 1. All egg mass counts were conducted in early fall in accordance with the methods described in the Gypsy Moth Egg-Mass Sampling With Fixed and Variable Radius Plots handbook prepared by the USDA. The current threshold for treatment established by the United States Forest Service (USFS) is 500 egg masses/acre. Other criteria considered include whether the forest habitat is favorable to the gypsy moth and whether the proposed block is within a visitor use area or adjacent to a residential community. This information, together with defoliation surveys and a subsequent recommendation by NPS and USFS personnel, forms the primary basis for treatment area selection.

III. DESCRIPTION OF THE ENVIRONMENT

Prince William Forest Park consists of approximately 17,600 acres of mixed hardwood forest within a major portion of the Quantico Creek watershed and the lower portion of the Chopawamsic Creek watershed. The park's relatively large size and the fact that it protects a significant portion of mature eastern deciduous forest make it a significant natural resource. In addition, because the park includes two physiographic provinces and lies in the transition zone between northern and southern climates, it exhibits a wide range of habitat and vegetative communities. Despite its history of human activity, the recovery of the area has led to its recognition as one of the least impacted watersheds in the Commonwealth of Virginia.

Most of the park lies within the Piedmont Physiographic Province. Typical of the Piedmont, the park is a lowland plateau with rolling hills and stream cut valleys. Elevations range from about 10 feet up to 400 feet above sea level. About one fourth of the park lies in the Coastal Plain Physiographic Province, which is of flatter relief and contributes significantly to the geological diversity of the park. The Coastal Plain consists of stratified marine sediments of sand, silt, clay and gravel. The older Piedmont consists largely of granite, gneiss and mica schist. The park also has large mineral deposits, primarily pyrite and associated minerals. The largest concentration of pyrite is found at the confluence of the two main branches of Quantico Creek.

The dominant forest species in the park are white oak, red oak, tulip-poplar, and American beech, along with occasional large stands of Virginia pine. Some uncommon or rare tree species present include butternut, bigtooth aspen, black walnut, sweet bay magnolia, and eastern hemlock, as well as floodplain species like American sycamore. The park includes one seepage swamp area in which poison sumac has been observed, and an Eastern Hemlock stand designated as a Conservation Area by the Virginia Department of Conservation and Recreation, Division of Natural Heritage (VA, DNH 1999). Several of these species are at their distributional limits in the park. Understory species include dogwood, redbud, mountain laurel, and American holly.

Ferns, mosses, vines and wildflowers form the groundcover. Cardinal flower and Hercules club are common in the park, but uncommon elsewhere. The Small Whorled Pogonia (*Isotria medeoloides*), a federally listed threatened plant species, is considered one of the rarest plants in the United States and has been identified in the park. Lemmer's pinion moth, *Lithophane lemmeri*, a state rare moth, and the Sedge sprite, a state rare damselfly, have also been found in the park (Roble, 2002). Several state Watch List species including the Diana butterfly (*Speyeria diana*), the tiger beetle (*Cicindela unipunctata*), and the star-nosed mole (*Condylura cristata cristata*) have been observed in PRWI. The first documented observation of a timber rattlesnake (*Crotalus horridus horridus*) in Prince William County was recorded in the park in 1992.

The park's dense forests and varied topography provide diverse habitat for wildlife species. White-tailed deer, wild turkey, fox and beaver populations thrive within the park. Small mammals, reptiles and amphibians are abundant. American black bear have been observed both in the park and in the surrounding environs. Owls and hawks, pileated woodpeckers, warblers, bluebirds and other songbirds are known to inhabit the park. Bald eagles, although not known to nest in the park, have been observed passing through the area.

Table 2: Rare, Threatened and Endangered Species in Prince William Forest Park

Species	Federal Status	Global Rank / State Rank
Small Whorled Pogonia (Isotria medeoloides)	Threatened	G2; S2
Lemmer's pinion moth (*Lithophane lemmeri*)	N/A	G3/G4; S1/S2
Sedge sprite (*Nehalennia irene*)	N/A	G5; S1

IV. ALTERNATIVES

A. PROCESS USED TO FORMULATE THE ALTERNATIVES

Alternatives for gypsy moth suppression were developed within the objectives set for the project, and were based upon National Park Service guidelines and policy for Integrated Pest Management. Areas were selected based upon their potential for defoliation, tree mortality, habitat loss, and impact to the visitor use experience. The three insecticides the US Forest Service recommends for use in gypsy moth suppression projects on federal lands, *Bacillus thuringiensis* (B.t.), Gypchek®, and Dimilin (diflubenzuron) (USFS, 1995).

Bacillus thuringiensis variety *kurstaki* (B.t.k.) is a bacterium that is largely specific to the Order Lepidoptera and has been widely used for gypsy moth suppression in the United States, with over 4.2 million acres treated since 1980 (Reardon et.al, 1994). B.t.k. is a stomach poison, paralyzing the gut which causes the larva to stop feeding. Aerial applications are made during the second and early third instar, since the product must be ingested, and the stomachs of later instar larvae are much less susceptible to its effects. Results from monitoring aerial B.t.k.

application using spray deposit cards on the forest floor have indicated that the majority of the B.t.k. is intercepted by the leaves of the forest canopy, making B.t.k. available only to those insects feeding on the leaves of the canopy. B.t.k. has been shown to have low toxicity to vertebrates and plants, the main concern is with non-target insects. Since it is largely specific to Lepidoptera, the only organisms likely to be affected by B.t.k. are moth and butterfly larvae that feed on treated plants within 4-10 days of the application. The use of a single application of B.t.k., rather than a double application, significantly reduces the impact to non-target lepidoptera. No adverse effects of B.t.k. on humans have been demonstrated.

Gypchek® is a formulation of the nucleopolyhedrosis virus (NPV). It is specific to the gypsy moth and has not been shown to adversely affect other species of Lepidoptera, other insects, or other orders of animals or plants, and no impacts to humans have been found. The virus attacks and disintegrates the internal tissues and organs of the larva causing death within 10 to 14 days.

Diflubenzon (Dimilin) is a chemical insecticide which acts as a chitin inhibitor and an insect growth regulator. It is non-specific and has the potential to affect many species of insects and invertebrates. It may not be sprayed over bodies of water because of its high toxicity to aquatic invertebrates.

B. ALTERNATIVES ELIMINATED FROM DETAILED STUDY

1. Other Methods for Gypsy Moth Management

The FEIS lists several methods for gypsy moth management that are not effective for suppression including mechanical intervention (i.e. removing/destroying egg masses, tree banding, etc.), the use of insecticides other than B.t., Gypchek® , or Diflubenzuron, and the introduction of natural controls (pathogens, parasitoids, or predators). There are several techniques that may be effective only at low egg mass densities (<10 egg masses/acre) including sterile insect releases, pheromone based mating disruption, male moth traps. Since Prince William Forest Park is experiencing high egg mass densities and has established a goal of suppressing current gypsy moth populations, these methods were not considered for use.

2. Application of Diflubenzuron (Dimilin)

As discussed above, Diflubenzuron is a chitin inhibitor that affects not only Lepidoptera species, but many species of insects and invertebrates, and is particularly toxic to aquatic invertebrates. Of the insecticides recommended for control of the gypsy moth, it persists the longest in the environment. Diflubenzuron was recommended in the USFS Biological Evaluation for Prince William Forest Park (2002) based on the high egg mass densities and the location of the infestations. The use of this product, however, is not consistent with the National Park Service's Integrated Pest Management approach to gypsy moth suppression, and our goals of minimizing impacts to non-target organisms during treatment. For these reasons, this alternative is not being considered for use.

C. ALTERNATIVES CONSIDERED IN DETAIL

Alternative 1 - No Action.

The National Park Service would take no action to suppress gypsy moth populations within Prince William Forest Park. The gypsy moth populations would be controlled solely by natural forces including weather, competition, food availability, parasites, pathogens, and various predators. Oak Ridge Campground and the Scenic Drive may experience significant defoliation, tree mortality, and loss of recreational value. In addition, populations of the gypsy moth may spread to uninfested areas, increasing the acreage needing treatment in subsequent years.

Alternative 2 - One Application of *Bacillus thuringiensis* variety ***kurstaki* (38 BIU).**

This is the preferred alternative. *Bacillus thuringiensis* variety *kurstaki* would be applied to the treatment block identified through the gypsy moth population surveys. The application would be made using low flying fixed wing aircraft or helicopter at a rate of 38 BIU (Billion International Units) per acre. Applications will be made to the tree canopy during the second and third instar stages, and will be followed by larval monitoring conducted by NPS staff. The area recommended for treatment is approximately 143 acres. Maps of the proposed treatment area are in Appendix 2.

Alternative 3 - One Application of Gypchek®.

This alternative calls for the application of Gypchek® to the treatment block identified through the gypsy moth population surveys. While this alternative would not affect non-target Lepidoptera species, it is not being used by the Virginia Department of Agriculture and Consumer Services for suppression efforts this season. The application would be made using low flying fixed wing aircraft or helicopter to the tree canopy during the first or second instar. As in Alternative 2, larval monitoring would be conducted by NPS staff following the treatment. The area recommended for treatment is approximately 142.70 acres. Maps of the proposed treatment area are in Appendix 2.

V. ENVIRONMENTAL IMPACTS

Numerous ecological, aesthetic, economic, visitor-use, and safety concerns have been considered in assessing the potential environmental impacts of the alternatives. There are no anticipated impacts to populations of federally listed threatened or endangered species. Table 3 provides a summary of the impacts of the considered alternatives. Only those resources affected by the alternatives will be discussed in detail. Every effort will be made throughout the project to conduct the safest possible program.

A. AIR QUALITY

Affected Environment

The proposed spray block is located within an ozone non-attainment area, and a state volatile organic compounds and nitrogen oxides emission control area.

Impact

Alternative 1
There will be no impact as a result of this alternative.

Alternative 2
This alternative will involve a low-flying fixed wing aircraft flying over the park with an estimated treatment time of less than 1 hour. The park has requested that treatment occur in the early morning hours, before 8 am, which will minimize impacts to air quality if the treatment day is an "ozone alert day." An ozone alert day is not expected as the program will take place in late April or early May. No significant impacts to air quality are expected due to the spray operation, especially considering that the airspace over the park is within the flight path for Dulles International Airport and routine military aircraft exercises on Quantico Marine Corps Base.

Alternative 3
This alternative will involve a low-flying fixed wing aircraft flying over the park with an estimated treatment time of less than 1 hour. The park has requested that treatment occur in the early morning hours, before 8 am, which will minimize impacts to air quality if the treatment day is an "ozone alert day." An ozone alert day is not expected as the program will take place in late April or early May. No significant impacts to air quality are expected due to the spray operation, especially considering that the airspace over the park is within the flight path for Dulles International Airport and routine military aircraft exercises on Quantico Marine Corps Base.

B. NOISE

Affected Environment
PRWI is surrounded by 3 major roads, Interstate 95 and State Routes 234 and 619, and is adjacent to Quantico Marine Corps Base. Although the forest provides a buffer against most noise allowing for natural quiet, occasional interruptions occur due to training activities on the base including artillery and aircraft noises.

Impact
Alternative 1
There will be no impact as a result of this alternative.

Alternative 2
There will be temporary noise impacts during the spray operation from the low flying aircraft. This impact is limited to one day and will occur only in the early morning hours. There will be no cumulative impact.

Alternative 3
There will be temporary noise impacts during the spray operation from the low flying aircraft. This impact is limited to one day and will occur only in the early morning hours. There will be no cumulative impact.

Table 3. Summary of Environmental Impacts of the Considered Alternatives

Resource Assessed	**Alternative 1** **No Action**	**Alternative 2** **One Application of *Bacillus thuringiensis* variety *kurstaki***	**Alternative 3** **One Application of Gypchek®**
Air quality	No impact.	No impact.	No impact.
Archaeological Resources	No impact.	No impact.	No impact.
Cultural Resources	No impact.	No impact.	No impact.
Floodplains	No impact.	No impact.	No impact.
Park Infrastructure	No impact.	No impact.	No impact.
Noise	No impact.	Minimal impact during spray operation from the low flying aircraft.	Minimal impact during spray operation from the low flying aircraft.
Safety	Potential impacts to safety from hazard trees killed as a result of gypsy moth activity. An increase in the fire danger may also occur due to any standing dead trees.	No impact due to insecticide applications. May reduce safety threat by preventing gypsy moth related tree defoliation. B.t.k. is not toxic to humans in the treated areas	No impact due to insecticide applications. May reduce safety threat by preventing gypsy moth related tree defoliation. Gypchek®. is not toxic to humans in the treated areas, although people who are sensitive to gypsy moths may experience the same symptoms if they come in contact with this insecticide.
Scenic Value	Significant effect on the scenic environment. Defoliated and/or dead trees detract from the scenic value of the park, which is known for its 17,600 acres of Piedmont forest.	Will help to protect the scenic value by minimizing the potential for defoliation.	Will help to protect the scenic value by minimizing the potential for defoliation.

Resource Assessed	Alternative 1 No Action	Alternative 2 One Application of *Bacillus thuringiensis* variety *kurstaki*	Alternative 3 One Application of Gypchek®
Socio-economic Environment	May reduce the number of visitors to the park and to Oak Ridge Campground. This may negatively impact the surrounding community in the town of Triangle.	Temporary impact due to treatment. Oak Ridge Campground will be closed the afternoon before and will not open until 6 hours after treatment.	Temporary impact due to treatment. Oak Ridge Campground will be closed the afternoon before and will not open until 6 hours after treatment.
Surface Water Quality and Wetlands	Defoliation and loss of mature trees may impact the water quality in the park.	No impact.	No impact.
Federal Listed Threatened and Endangered Species	Possible impacts to *Isotria medeoloides* colonies.	No impact.	No impact.
Vegetation	Deterioration of tree health and possible tree mortality due to gypsy moth feeding activities. May result in changes in understory composition.	No impact. Would help protect against defoliation by controlling gypsy moth populations.	No impact. Would help protect against defoliation by controlling gypsy moth populations.
Visitor Experience	Loss of mature trees, the presence of gypsy moth caterpillars and their frass may negatively affect the visitor use experience at the park.	Minimal impact during the treatment operations. Oak Ridge Campground and a portion of the Scenic Loop will need to be shut down while the area is sprayed.	Minimal impact during the treatment operations. Oak Ridge Campground and a portion of the Scenic Loop will need to be shut down while the area is sprayed.
Wildlife	Impacts to wildlife species due to habitat loss or alteration.	Impacts to gypsy moth larvae and other species of Lepidoptera that feed on plants within 4-10 days of the application.	No impact except to gypsy moth larvae.

C. SAFETY

Affected Environment

Prince William Forest Park has between 40-60 persons on staff at any point during the year, and receives approximately 225,000 visitors annually. Of those visitors, 3300 utilized Oak Ridge Campground in 2002, and a majority traveled the Scenic Loop.

Impact

Alternative 1

Under Alternative 1, the park may see an increase in the number of hazardous trees as a result of gypsy moth activity. These trees pose a safety concern to staff and visitors due to the danger of falling limbs and trees, and also may increase the fire danger in developed areas as the dead wood dries. In addition, some people are allergic to gypsy moth and may develop skin irritations as a result of contact with the caterpillars.

Alternative 2

Alternative 2 is likely to minimize or prevent the safety hazards that may result under Alternative 1. Studies have shown that B.t.k. is not toxic to humans in the treated areas. The only reports of sensitivities to B.t.k. have been with those individuals directly handling and applying the insecticide.

Alternative 3

Alternative 3 is likely to minimize or prevent the safety hazards that may result under Alternative 1. Studies have shown that Gypchek® is not toxic to humans in the treated areas, although people who are sensitive to gypsy moths may experience the same symptoms if they come in contact with this insecticide. As with B.t.k., reactions associated with Gypchek® are most likely to occur in those individuals directly handling and applying the insecticide.

D. SCENIC VALUE

Affected Environment

PRWI is composed of 17,600 acres of Piedmont forest located within the Quantico Creek watershed. Park neighbors and visitors are attracted by the dense stands of hardwoods and the diverse communities they support. In addition, the park is becoming an increasingly popular destination for viewing fall foliage.

Impact

Alternative 1

Under this alternative, the gypsy moth may negatively impact the scenic value of the park by defoliating the native trees, especially the oak species. Dead and/or defoliated trees detract from the scenic value of the park. Conversely, the defoliation may open the canopy and allow understory vegetation to thrive in some areas, which may be aesthetically pleasing to some visitors.

Alternative 2

No impacts are expected as a result of this alternative and it may help to protect the scenic value by minimizing the potential for defoliation.

Alternative 3
No impacts are expected as a result of this alternative and it may help to protect the scenic value by minimizing the potential for defoliation.

E. SOCIO-ECONOMIC ENVIRONMENT and VISITOR EXPERIENCE

Affected Environment
Prince William Forest Park receives approximately 225,000 visitors annually. Visitation is highest during the spring, summer, and fall seasons when people are drawn to the park for its recreational opportunities. The park is located in the small town of Triangle, Virginia and it is likely that local restaurants, gas stations, and stores receive business from park visitors and staff.

Impact
Alternative 1
Under this alternative, gypsy moth activity is likely to negatively impact the visitor use experience due to the presence of a large number of caterpillars and frass in the campground and along the Scenic Loop, and reduction of the amount of shade in these areas as a result of defoliation. This may reduce the number of visitors to the park and to Oak Ridge Campground during the months when the gypsy moth is active which may intern negatively impact the surrounding community in the town of Triangle.

Alternative 2
There will be temporary impacts to visitors due to noise, and prohibited access to treated areas for several hours following treatment. The campground will need to be closed the evening before treatment and will not open until six hours after treatment. However, the impacts described under Alternative 1 may be prevented, as this alternative is meant to control gypsy moth populations.

Alternative 3
There will be temporary impacts to visitors due to noise, and prohibited access to treated areas for several hours following treatment. The campground will need to be closed the evening before treatment and will not open until six hours after treatment. However, the impacts described under Alternative 1 may be prevented, as this alternative is meant to control gypsy moth populations.

F. SURFACE WATER QUALITY AND WETLANDS

Affected Environment
Prince William Forest Park contains 80% of the Quantico Creek watershed and the lower portion of the Chopawamsic Creek watershed. In addition, the park has numerous vernal pools and a seepage swamp area. The Quantico Creek watershed consists of 2 creeks, South Fork Quantico Creek and Quantico Creek, and numerous tributaries. The park has 5 man-made lakes or ponds that are used as recreation areas and provide wildlife habitat. The water quality of the creeks in

PRWI is considered to be good, and the park is used as a reference or benchmark for good water quality in scientific studies in the area.

Impact

Alternative 1

Under this alternative, the defoliation by the gypsy moths that is expected may negatively impact the water resources. Loss of shade may result in an increase in water temperature and a subsequent decrease in dissolved oxygen. Sediment and nutrient loads and stream flow may be affected as a result of vegetation loss in the area.

Alternative 2

No impacts to water quality are expected as a result of this alternative. The insecticide is not being applied directly to surface water and is not expected to affect water quality in the area.

Alternative 3

No impacts to water quality are expected as a result of this alternative. The insecticide is not being applied directly to surface water and is not expected to affect water quality in the area.

G. FEDERAL LISTED THREATENED AND ENDANGERED SPECIES

Affected Environment

Prince William Forest Park has one plant species that is classified as federally threatened, *Isotria medeoloides*, the small whorled pogonia. Several colonies of this plant have been identified in the park, although none of the colonies are located within the proposed treatment block. Dr. Donna Ware, College of William and Mary, has studied the habitat requirements for this species and has found that it occurs in habitat that is very susceptible to gypsy moth defoliation. The Small Whorled Pogonia Recovery Plan (1st Revision), prepared by the United States Fish and Wildlife Service (USFWS), cites changes in the amount of light reaching the forest floor due to defoliation by the gypsy moth as a threat to the species.

In addition to the *Isotria*, the park has one state listed rare moth, Lemmer's pinion moth (*Lithophane lemmeri*), and the Sedge sprite (*Nehalennia irene*). The Lemmer's pinion moth is a Lepidoptera and may therefore be affected by suppression efforts using B.t.k. in the limited areas of treatment. B.t.k. has not been shown to impact Odonata. Gypchek ® is specific to the gypsy moth and does not affect other insect species.

Impact

Alternative 1

There are no federally listed species known to occur in the proposed treatment area. If the gypsy moth populations are not controlled and are allowed to spread into unifested areas, they may threaten the federally listed *Isotria medeoloides*. Increases in light availability due to canopy defoliation alter the habitat suitability and threatens this species.

Alternative 2

There are no federally listed species known to occur in the proposed treatment area. One state rare lepidoptera, *Lithophane lemmeri* has been identified in the park, and the application of B.t.k.

as prescribed under Alternative 2 may impact *Lithophane lemmeri*, as well as any other Lepidoptera in the area. The B.t.k. will only affect the larvae of these species who are feeding in the suppression area within 4-10 days of the treatment.

Alternative 3
There are no federally listed species known to occur in the proposed treatment area. Since Gypchek® is specific to gypsy moth larvae, it is not expected to impact any other species of Lepidoptera in the park.

H. VEGETATION

Affected Environment
PRWI contains 17,600 acres of Piedmont forest. The native vegetation within the proposed treatment area consists of oak-mixed hardwood. Small stands of Virginia pine mark old home sites and areas that were cleared over 65 years ago. The forest canopy is primarily composed of oak species, Virginia pine, tulip poplar, beech, red maple, and hickory. Oaks, the gypsy moth's preferred host, total about 73% of the canopy composition throughout the park.

Impact
Alternative 1
Under Alternative 1, the expected defoliation as a result of gypsy moth activity will weaken trees and cause some mortality. In addition, the increase in the amount of light reaching the forest floor may result in changes in the understory composition of the forest. While this may benefit some of the smaller herbaceous species, it may also allow for the invasion of non-native vegetation into these areas.

Alternative 2
No impact to the vegetation is expected as a result of Alternative 2. Plant species that are pollinated by Lepidoptera may be affected by application of B.t.k., but this effect is expected to be minor and not cumulative. It is likely that this alternative may protect against the impacts described under Alternative 1, as a result of the gypsy moth control.

Alternative 3
No impact to the vegetation is expected as a result of Alternative 3. It is likely that this alternative may protect against the impacts described under Alternative 1 as a result of the gypsy moth control.

I. WILDLIFE

Affected Environment
Prince William Forest Park is home to a diverse group of vertebrates including approximately 30 species of fish, 36 species of amphibians, 41 species of reptiles, 105 species of birds, and 37 species of mammals. White-tailed deer, wild turkey, fox and beaver populations thrive within the park. Small mammals, reptiles and amphibians are abundant. American black bear have been observed both in the park and in the surrounding environs. Owls and hawks, pileated woodpeckers, warblers, bluebirds and other songbirds are known to inhabit the park. Bald

eagles, although not known to nest in the park, have been observed passing through the area. Insects and other invertebrates have not been thoroughly inventoried in the park, but the Lemmer's pinion moth, *Lithophane lemmeri*, a state rare moth, and the Sedge sprite, a state rare damselfly, have been found (Roble, 2002), as have two state watch species, the Diana butterfly (*Speyeria diana*), and the tiger beetle (*Cicindela unipunctata*). These are discussed in section V.G.

Impact

Alternative 1

Under Alternative 1, impacts to native wildlife are expected as a result of habitat loss and alteration from the gypsy moth related defoliation. Decreased acorn production in weakened trees will reduce food availability, and a reduction in the canopy cover may result in increased temperatures on the forest floor and in the park's surface waters.

Alternative 2

Impacts to the feeding larvae of the park's Lepidoptera species are expected under this alternative. This impact is expected to be minimal and temporary. B.t.k. is not known to significantly affect any other wildlife species.

Alternative 3

No impacts are expected as a result of this alternative. Gypchek® is specific to the gypsy moth.

VI. MITIGATION AND MONITORING

A. MITIGATION

Misapplication of insecticides will be minimized as follows:

Topographic maps on which the treatment block is marked will be provided to each pilot as will the latitude and longitude coordinates. Global Positioning Systems will be used by the pilots to accurately locate and treat the proposed blocks. In addition, the pilots will be briefed on any unique or unusual features of the area.

NPS staff will be at the aircraft loading zone to answer any park-related questions the pilot may have about the treatment block. NPS personnel will not be in or around active aircraft.

The application will be made only when atmospheric conditions are appropriate. NPS staff will collect weather data (temperature, wind speed, and humidity), on the ground near the treatment block before any application is made.

The majority of the application will take place in the early morning. Oak Ridge Campground and the portion of the Scenic Loop that falls within the spray block will be closed for the duration of the spraying. The Scenic Loop will reopen within a few hours of the treatment, however, Oak Ridge Campground will remain closed until later that

afternoon. The park will have staff onsite patrolling the area to ensure that no one enters the spray block during the treatment.

Signs will be posted in the visitor center and on the wayside at the Oak Ridge registration area. Information regarding the treatment date will be made public through the use of a press release and the park's website.

Safety concerns regarding the use of low-flying aircraft and the aerial application of an insecticide have been addressed in the following ways:

The contractor will be providing nighttime security personnel at the airports.

Background investigations will be conducted for contractor personnel involved in the spray operation.

B. MONITORING

NPS staff will continue to monitor gypsy moth populations in PRWI in this and subsequent years. Standard surveys will be conducted, and the effectiveness of the proposed treatment will be assessed. The decision to propose treatment in the park was based upon the project objectives of suppressing gypsy moth populations, preventing new infestations, reducing tree stress and mortality, and minimizing the effects on the public. As monitoring efforts continue, it is expected that treatment needs, locations, and acreages are expected to change. This is based upon knowledge of the pest and upon the history of the gypsy moth in the park. Separate Environmental Assessment's will be prepared to evaluate any potential future treatments.

VII. PUBLIC PARTICIPATION

A. SCOPING

Through discussions with the United States Forest Service and the Virginia Department of Agriculture and Consumer Services, through review of scoping sessions held during the initial suppression efforts in the 1990's, and upon review of the comments received during last year's suppression efforts, the following concerns were identified:

1. The impacts of the gypsy moth on the environment
2. The available suppression options and their impacts on the public and the environment
3. The safety of aerial treatments in light of recent world events

All of these issues are addressed in this Environmental Assessment.

B. PUBLIC INVOLVEMENT AND NOTIFICATION

This Environmental Assessment will be made available for public review for a period of 30 days from March 10 through April 9, 2003 in compliance with the National Environmental Policy

Act. Copies are available at the park and on the park's website, http://www.nps.gov/prwi. The public is invited to submit comments and concerns which will be addressed in the Final EA.

C. COMMENTS, CONCERNS, ISSUES

To be addressed in the final EA.

VIII. LIST OF AGENCIES AND INDIVIDUALS CONSULTED

Jolie Harrison, Endangered Species Biologist, United States Fish and Wildlife Service

Larry Nichols, Virginia Department of Agriculture and Consumer Services

DeeDee Sellers, Entomologist, United States Forest Service

Jil Swearingen, Integrated Pest Management Coordinator, National Capital Region, National Park Service

IX. PREPARER

Jennifer A. Lee, Biologist, Prince William Forest Park, National Park Service

X. REVIEWERS

Robert S. Hickman, Superintendent, Prince William Forest Park, National Park Service

Brian Carlstrom, Chief, Division of Resource Management, Prince William Forest Park, National Park Service

Jil Swearingen, Integrated Pest Management Coordinator, National Park Service, Natural Resources and Science Division, National Capital Region

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XII. APPENDICES

Appendix 1 - Egg mass survey results

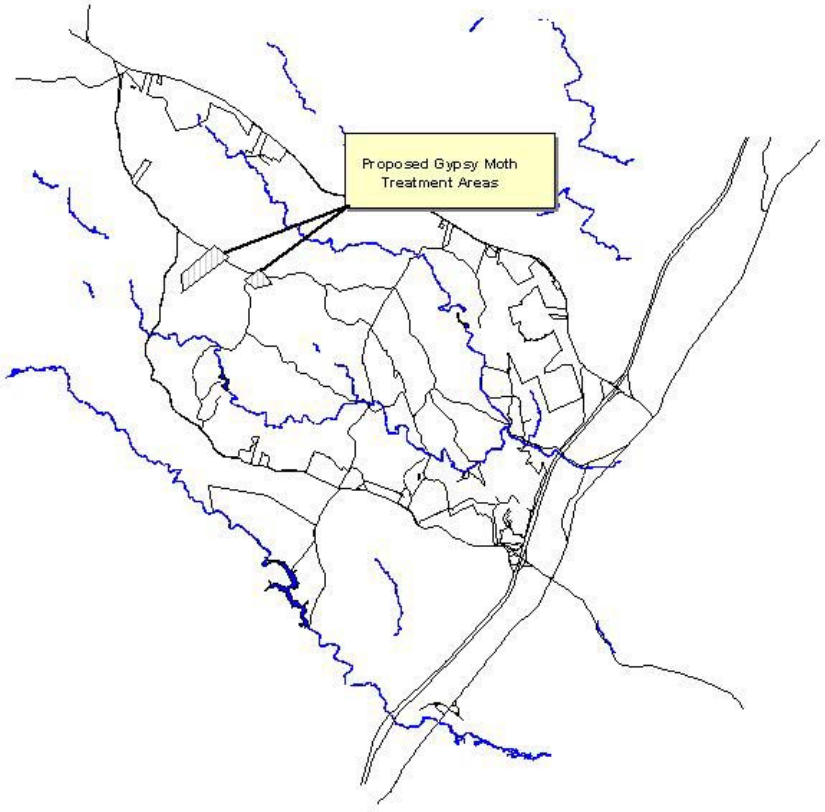
2002 PRWI Gypsy Moth Egg Mass Survey Data

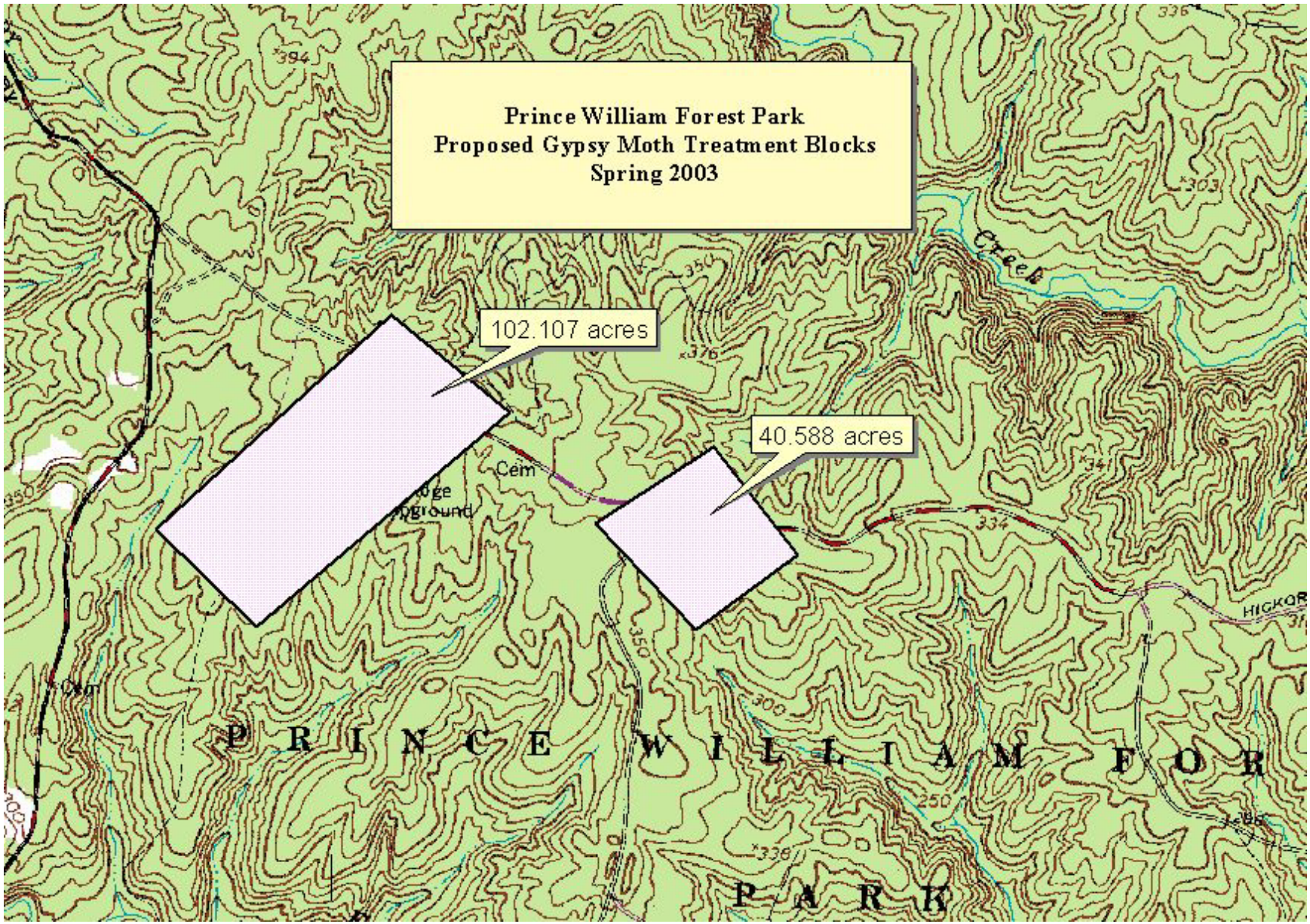
Date	Plot	Location	Old Egg Masses	New Egg Masses	Canopy	Density (egg masses/acre)
9/23/02	1	Oak Ridge Entrance Road (Right Side)	2	0	12	0
9/23/02	2	Oak Ridge Entrance Road (Left Side)	5	0	12	0
9/23/02	3	Oak Ridge Between sites A25 and A26	24	18	87	2211.43
9/23/02	4	Oak Ridge Behind sites A20 and A22	27	24	45	1807.06
9/23/02	5	Oak Ridge Behind site C31	34	12	243	3015.65

Average Density = 1406.83 = 1407 egg masses/acre (including the entrance road, plots 1-5)

Appendix 2 - Proposed treatment area maps

PRINCE WILLIAM FOREST PARK
(Area to be treated is shaded gray.)




Prince William Forest Park
Proposed Gypsy Moth Treatment Blocks
Spring 2003
102.107 acres
40.588 acres
Cem
Creek
PRINCE WILLIAM FOR
PARK

Appendix 3 - Press Releases

National Park Service
U.S. Department of the Interior

Prince William
Forest Park

Prince William Forest Park
18100 Park HQ Road
Triangle, Virginia 22172

703 221-7181 phone
703 221-4322 fax

Prince William Forest Park News Release

For Immediate Release
Jennifer Lee 703/221- 3406

GYPSY MOTH SUPPRESSION PROPOSAL

This spring, Prince William Forest Park is proposing to control gypsy moth caterpillars with one application of *Bacillus thuringiensis* variety *kurstaki*, under a contract secured by the Virginia Department of Agriculture and Consumer Services. Prince William Forest Park staff have been monitoring gypsy moth populations since the 1970s, and performed gypsy moth suppression from 1989 through 1995 and in 2002.

A draft Environmental Assessment is available for public review for 30 days from March 10 through April 9, 2003. A copy of the EA can be obtained by writing to the park at

Prince William Forest Park
ATTN: Resource Management
18100 Park Headquarters Rd.
Triangle, VA 22172

or by calling 703- 221- 3406. The draft EA will also be posted to the park's website: http://www.nps.gov/prwi.

Please forward your written comments to:

Prince William Forest Park
Resource Management
18100 Park Headquarters Rd.
Triangle, VA 22172

If commenting by email, please address your comments to Jennifer_Lee@nps.gov.

All comments are due in writing by April 9, 2003.

- NPS-

Appendix 4 - Compliance Document

United States Department of the Interior

NATIONAL PARK SERVICE
Prince William Forest Park
18100 Park Headquarters Road
Triangle, VA 22172

(703) 221-2366
FAX (703) 221-4322

March 3, 2003

Memorandum

To: Files

From: Biologist, Prince William Forest Park

Subject: ESA, Section 7 Consultation, Gypsy Moth Suppression Project

On March 3, 2003, I spoke with Jolie Harrison, United States Fish and Wildlife Service Endangered Species Biologist, regarding the proposed Gypsy Moth Suppression Project at Prince William Forest Park. I described the proposed treatment block and the preferred insecticide, *Bacillus thuringiensis* variety *kurstaki*. *Isotria medeoloides*, the small whorled pogonia, is the only USFWS Threatened or Endangered species in the park, and it is not located in the proposed treatment area. Ms. Harrison stated that the park could make a "no effect" decision in this case, and that our phone conversation satisfied the requirements outlined in Section 7 of the Endangered Species Act.